CHAPTER XI

DESIGN SUBMISSION REQUIREMENTS

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CHAPTER XI

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1. **INTRODUCTION**. The following information provides general guidance to the A-E designer for submission of the various design documents for Army and Air Force projects, including medical projects. The various design document requirements are specified below.

1.1 **Applicable Submission Phases** for each project will be identified in the particular A-E Scope of Work (SOW) as a basic contract requirement or option to the contract. The project SOW or specific instructions from the supervision district will give the submission distribution schedule, reproduction medium(s) and number of copies for the required submissions.

2. **ARMY/AIR FORCE PROJECTS GENERAL SUBMISSION PHASES**. The following phases of design are typical for the various types of Army and Air Force projects. Projects may incorporate all or some of the phases based on the User's specific requirements stated in A-E SOW. The cost engineering requirements for each submittal are in Chapter X, Cost Engineering Guide for Military Construction.

2.1 **Requirements and Management Plan (RAMP) (3%) (Air Force)**. The RAMP provides the facility needs to the design agent (US Army Corps of Engineers). The design agent may utilize an A-E contract to assist in RAMP development. A RAMP consists of two documents: a Requirements Document (RD); and a Project Management Plan (PMP). The major components of a RD are comprehensive project description, an area development plan (site development, relationship to the base comprehensive plan and architectural compatibility), and environmental concerns that impact the project. The host Base Civil Engineer (BCE) normally prepares and coordinates the RD with MAJCOM and furnishes it to the Air Force Design manager (DM). An A-E contract may be utilized for the preparation of the RD. The DM develops the PMP together with the design agent or A-E and MAJCOM. The major components of a PMP are an acquisition strategy and baseline project schedule. The requirements for the RAMP are stated in Air Force Engineering Technical Letter 95-2. The RAMP plus Air Force Parametric Cost Engineering (PACES) cost

estimate provides information to finalize the 1391 before its submission for budget approval.

2.2 **Schematic Design Submittal (5%) (Army)**. The submittal consists of single-line type drawings showing the design team's interpretation of the User's stated needs. This is accomplished through presentation of different layout schemes to the User to review and select the one that best meets their functional needs. The submittal shall consist of the following unless otherwise specified:

2.2.1 Small scale site plan indicating siting of building, parking, existing utility locations and ingress/egress to site and/or building.

2.2.2 Sketch elevations to show scale and mass of the facility including story heights.

2.2.3 Materials of construction.

2.3 **Pre-Concept Control Data Submittal (10%) (Army)**. This submittal is a short narrative on A4 metric, 210 mm X 297 mm reproducible bond, which develops a firm basis on which the design can proceed. The narrative discusses the designer's approach to the project for each plan and any site or utility problems that could affect the design and/or construction cost of the project. Possible solutions to these problems are presented and cost reduction measures discussed, if necessary. The narrative should include brief comparisons of cost impacts of the various alternatives. The submittal shall consist of the following unless otherwise specified:

2.3.1 One to three single-line floor plans.

2.3.2 Site plan indicating siting of building, parking, existing utility locations and ingress/egress to site and/or building.

2.3.3 Sketch elevations of building.

2.3.4 Narrative addressing proposed construction materials and methods, structural and HVAC system alternatives, and any unusual construction requirements.

2.3.5 A cost estimate shall be prepared and submitted as specified in Chapter X, Cost Engineering Guide for Military Construction.

2.4 **Charette Requirements.** A Charette is a process involving major commands, designers, users, and installation management decision makers to gather information on project requirements and reach consensus to enable the design to proceed to completion with a clear understanding by all parties as to project scope, conceptual design, and budget for the facility. The process is performed in a short period of time and includes meetings to maximize the user's access to the designer and construction management team, and the designer's access to the site and the installation management staff during the early steps in design development. The purpose of the charette and the products that are required from this process must be clearly defined to participants. Participants must be furnished the project functional requirements, and have technical and policy knowledge needed and the authority to make firm decisions and commitments.

2.4.1 The products required of the design Charette should be established through consultation between the project user and design agent managers early in the process and then given to all participants. The product developed during a charette typically is a written and graphic depiction of the project concept design, and a construction cost estimate that becomes the basis for completing the design. The document produced typically is equivalent to the Project Definition Brochure (Air Force) or Project Engineering Brochure (Army) as described in more detail below.

2.5 **Project Definition (10%-30%) (Air Force).** The Project Definition is prepared based on the RAMP plus PACES cost estimate and provides sufficient documentation for Congressional Submittal. The Project Definition submittal requirements are identified in CTL 90-1 "Management of the MILCON Planning and Execution Process."

2.5.1 Purpose. The purpose of the Project Definition phase is the development of a clear and final definition, with customer involvement, of the project’s requirements. This phase should provide sufficient information to identify and meet functional requirements, determine the engineering sufficiency of the design for each technical discipline and provide the earliest possible check as to whether

construction costs will be within the program budget. The level of design required (10%-30%) is dependent on requirements of the user.

2.5.2 Brochure. The Project Definition phase typically includes a narrative and graphic brochure-type presentation of the functional and technical design for the project. The narrative should discuss the civil, site engineering, utilities availability and requirements for project connection; architectural style and compatibility with installation design guidance, functional relationships and their space requirements; mechanical, electrical, structural systems, and physical security needs. The report should give the basis of design including results of preliminary building foundation site investigation, design assumptions, preliminary calculations, life cycle cost considerations, and life safety and energy considerations. Also summarize environmental issues including remediation, lead based paint, asbestos in materials, regulated air emissions, HTRW wastes, industrial wastewater, etc. and identify required permits and any waivers needed. The document will include an index of Corps of Engineers Military Guide Specifications applicable to the project.

2.5.3 Format. The format for the Air Force project definition brochure is as presented in AEIM Chapter IX, Design Analysis.

2.5.4 Sketches/drawings required for the Air Force project definition brochures shall be identified as attachments and include the following as a minimum:

2.5.4.1 Civil (Attachment A-1, A-2, etc.) Site plan showing proposed buildings, parking, required demolition, grading when substantial cut/fill is needed, etc., utility plan for electrical, gas, stem, water, etc.

2.5.4.2 Architectural(Attachment B-1, B-2, etc.) Functional layout, floor plan, architectural compatibility, building elevations, typical wall sections.

2.5.4.3 Structural (Attachments C-1, C-2, etc.) Foundation type and sizing, floor and roof sections, any special framing requirements, exterior wall type and sizing.

2.5.4.4 Mechanical (Attachments D-1, D-2, etc.) Single line ductwork layout and sizing, equipment room layout and preliminary schedules for major equipment, fire protection.

2.5.5 A cost estimate shall be prepared as specified in Chapter X, Cost Engineering Guide for Military Construction.

2.6 **Project Engineering Phase/Code 3 (10%-15%) (Army).** The design process will have a Project Engineering Phase.

2.6.1 Purpose. The purpose of the Project Engineering phase is the development of a clear and final definition, with customer involvement, of the project's requirements. This phase should provide sufficient information to identify and meet functional requirements, determine the engineering sufficiency of the design for each technical discipline and provide the earliest possible check as to whether construction costs will be within the program budget.

2.6.2 Brochure. The Project Engineering phase typically includes a narrative and graphic brochure-type presentation of the functional and technical design for the project. The narrative should discuss the civil, site engineering, utilities availability and requirements for project connection; architectural style and compatibility with installation design guidance, functional relationships and their space requirements; mechanical, electrical, structural systems, and physical security needs. The report should give the basis of design including results of preliminary building foundation site investigation, design assumptions, preliminary calculations, life cycle cost considerations, and life safety and energy considerations. Also summarize environmental issues including remediation, lead based paint, asbestos in materials, regulated air emissions, HTRW wastes, industrial wastewater, etc. and identify required permits and any waivers needed. The document will include an index of Corps of Engineers Military Guide Specifications applicable to the project.

2.6.3 Format. The format for the Army Project Engineering brochure is as presented in AEIM Chapter IX, Design Analysis.

2.6.4 Sketches/drawings required for the Army project engineering brochures shall be identified as attachments and include the following as a minimum:

2.6.4.1 Civil (Attachment A-1, A-2, etc.) Site plan showing proposed buildings, parking, required demolition, grading when substantial cut/fill is needed, etc., utility plan for electrical, gas, stem, water, etc.

2.6.4.2 Architectural (Attachment B-1, B-2, etc.) Functional layout, floor plan, architectural compatibility, building elevations, typical wall sections.

2.6.4.3 Structural (Attachments C-1, C-2, etc.) Preliminary foundation, floor and roof sections, and any special framing requirements.

2.6.4.4 Mechanical (Attachments D-1, D-2, etc.) Single line ductwork layout and sizing, equipment room layout and preliminary schedules for major equipment, fire protection.

2.6.5 A Cost estimate shall be prepared as specified in Chapter X, Cost Engineering Guide for Military Construction.

2.7 **Concept Design (35%) (Army)**. (Concept Design will not normally be used.) This submittal typically consists of a narrative and graphic brochure-type presentation with enough information for the reviewer to understand the functional and technical approach the designer will follow to complete the project. As a minimum, the narrative discusses the civil, site engineering and architectural style and compatibility with installation guidance; functional relationships; construction materials and finishes; structural and foundation system; communications systems; power and electrical systems; plumbing and HVAC systems; physical security needs; and environmental design issues. Items or details that cannot adequately be described in narrative form are graphically shown on foldout drawings, sketches, tabulations, and/or photographs bound in the brochure. An estimate of construction costs, time and phasing is also included in the brochure. In addition, an index of the anticipated guide specifications to be utilized for the design is included. If required, Energy Analysis Studies, described in Chapter V of the AEIM, are submitted with the Concept Data brochure but bound separately. A cost estimate developed and submitted as specified in Chapter X, Cost Engineering Guide for Military Construction is required.

2.7.1 The purposes of the "Concept Design" for a military project are as follows:

2.7.1.1 To provide sufficient design information for the Using Agency to determine the acceptability of the proposed design as meeting their functional requirements for

operational use and economical maintenance during the anticipated life of the facility.

2.7.1.2 To provide sufficient data for a determination of the engineering sufficiency and soundness of the basic approach to the design for each technical discipline. Also, it will serve as a documentary check that the designer has been provided or has developed the essential engineering criteria necessary for all facets of final computations and detailed development of a thoroughly engineered and coordinated, economical and functional design.

2.7.1.3 To provide a check as to whether construction costs will be within the Army allowable percentage of the programmed dollars.

2.7.1.4 To limit design submissions to only those data essential to provide the above information, so that a minimum of time and monies will have been expended to reach a point of decision for such problems as the following:

2.7.1.4.1 Funds inadequate for initial project scope, thus requiring;

2.7.1.4.1.1 a reduction of scope by size; and/or

2.7.1.4.1.2 additive bid items; and/or

2.7.1.4.1.3 reprogramming by Using Service to increase funds.

2.7.1.4.2 Incomplete understanding between either the designer, the Corps of Engineers, or the Using Service as to Using Service needs, and the monies required to provide for those needs.

2.7.1.5 To provide the designer, after review of the brochure, with an approved set of technical conditions with which he may proceed with confidence to develop the complete facility.

2.7.2 Cost Savings Review: The design team shall review their design for cost saving opportunities and cost effectiveness. This review will be to identify high-cost, low-value items required by criteria and/or User needs, where the cost to make a change is minimal compared to potential savings; changes that could reduce the anticipated construction time; and areas that appear suitable for formal

Value Engineering Studies. The team shall identify the ideas and areas where a formal VE Study is considered desirable to develop alternatives for achieving cost reduction in structures, equipment, materials or methods of construction and these ideas shall be documented in the Concept Data Brochure as an attachment.

2.7.3 The format for the Concept Data brochure is presented in AEIM, Chapter IX "Design Analysis".

2.7.4 Drawings required for the Concept Data Brochure are identified as attachments and include the following as a minimum:

2.7.4.1 Civil (Attachment A-1, A-2, etc.):

2.7.4.1.1 Project location map.

2.7.4.1.2 Site demolition plan (if required).

2.7.4.1.3 Site Plan.

2.7.4.1.4 Grading plan.

2.7.4.1.5 Utility plan.

2.7.4.2 Architectural (Attachment B-1, B-2, etc.):
2.7.4.2.1 Floor plan.

2.7.4.2.2 Building elevations.

2.7.4.2.3 Building sections.

2.7.4.2.4 Typical wall sections.

2.7.4.2.5 Roof plan.

2.7.4.2.6 Room finish schedule.

2.7.4.2.7 Fire Protection Plan.

2.7.4.3 Structural (Attachment C-1, C-2, etc.):

2.7.4.3.1 Preliminary foundation plan.

2.7.4.3.2 Framing plan(s).

2.7.4.3.3 Preliminary Foundation & Roof Sections/Details

2.7.4.4 Mechanical (Attachment D-1, D-2, etc.):

2.7.4.4.1 Plumbing fixture/drain location plan.

2.7.4.4.2 HVAC equipment location/duct work layout plan/schedules.

2.7.4.4.3 Fire protection systems plan.

2.7.4.5 Electrical (Attachment E-1, E-2, etc.):

2.7.4.5.1 Site plan.

2.7.4.5.2 Lighting plan.

2.7.4.5.3 Power plan.

2.7.4.5.4 Communications plan.

2.8 **Preliminary Design (60%)**. This submittal typically consists of a design analysis, working drawings, marked-up guide specifications, construction cost estimate, and color boards. This submittal shall incorporate the accepted comments made on earlier design efforts including the charette documentation, Project Engineering, Concept Design or Project Definition. The medium(s) and number of copies submitted for the Preliminary Design shall be as required by the A-E Design Contract or specific instructions from the supervising district.

2.8.1 Working Drawings. Drawings shall be prepared using CADD following the standards in Chapter VIII. Drawings required for the Preliminary Design shall include as a minimum:

2.8.1.1 General:

2.8.1.1.1 Cover sheet and index of drawings.

2.8.1.1.2 Location and vicinity map including haul routes.

2.8.1.2 Civil:

2.8.1.2.1 Site demolition plan (if required).

2.8.1.2.2 Site plan/details.

2.8.1.2.3 Grading plan.

2.8.1.2.4 Utility plan/profiles/details.

2.8.1.2.5 Pavement plan and details.

2.8.1.2.6 Soils boring logs.

2.8.1.3 Architectural:

2.8.1.3.1 Demolition plan (if required)

2.8.1.3.2 Floor plan(s).

2.8.1.3.3 Building elevations.

2.8.1.3.4 Interior and exterior wall sections.

2.8.1.3.5 Reflected ceiling plan.

2.8.1.3.6 Room finish and color schedules

2.8.1.3.7 Door and window schedules.

2.8.1.3.8 Black and white perspective drawing.

2.8.1.3.9 Furniture plan.

2.8.1.3.10 Life Safety plan.

2.8.1.4 Structural:

2.8.1.4.1 Foundation plan(s) and partial details.

2.8.1.4.2 Footing, grade beam, or rib schedule(s).

2.8.1.4.3 Roof framing plan(s) and partial details.

2.8.1.4.4 Intermediate framing plan(s).

2.8.1.4.5 Sections and partial details illustrating typical major foundation and superstructure main force resisting framing structural members and connections.

2.8.1.4.6 All plans, sections, and details of special structural foundation and framing elements unique to the project.

2.8.1.5 Mechanical:

2.8.1.5.1 Equipment schedules/locations.

2.8.1.5.2 Plumbing plan, risers, and details.

2.8.1.5.3 Mechanical room plan with equipment clearances.

2.8.1.5.4 Fire protection plan.

2.8.1.5.5 HVAC plan and major details.

2.8.1.5.6 Sequence of control and control schematics.

2.8.1.6 Electrical:

2.8.1.6.1 Site plan.

2.8.1.6.2 Lighting plan and fixture schedules.

2.8.1.6.3 Power plan and equipment layout.

2.8.1.6.4 Outline riser diagrams for power, communications, fire alarm, etc.

2.8.1.6.5 Communication plan.

2.8.1.6.6 Special plans as required. Examples: intrusion detection, cathodic protection, lightning protection, TEMPEST, television, etc.

2.8.2 Design Analysis. The design analysis shall address the items specified in Chapter IX, "Design Analysis" of the AEIM. The following calculations are furnished at the 60% design stage:

2.8.2.1 Civil:

2.8.2.1.1 Pavement type and thickness of structure (100% complete).

2.8.2.1.2 Sizing of utilities (100% complete).

2.8.2.1.3 Sizing of storm drainage systems (100% complete).

2.8.2.2 Structural:

2.8.2.2.1 Superstructure design loads, both vertical and lateral, and analysis for main force resisting framing system (100% complete).

2.8.2.2.2 Foundation design loads and design analysis for main structural foundation members (100% complete).

2.8.2.3 Mechanical:

2.8.2.3.1 HVAC load calculations (100% complete).

2.8.2.3.2 Fire protection calculations to include AFFF if appropriate (100% complete).

2.8.2.3.3 Compressed air calculations (100% complete).

2.8.2.3.4 Plumbing calculations (100% complete).

2.8.2.4 Electrical:

2.8.2.4.1 Load calculations (100% complete).

2.8.2.4.2 Lighting calculations (100% complete).

2.8.2.4.3 Miscellaneous calculations as required. Examples; cathodic protection, lightning protection, TEMPEST, intrusion detection, etc.

2.8.3 Working Specifications. Requirements for the 60% design specifications are covered in AEIM Chapter VII, Specifications.

2.8.4 Cost Estimate. Requirements for the 60% design cost estimate are covered in AEIM Chapter X, Cost Engineering Guide for Military Construction.

2.9 **Final Design**. The project plans and specifications are complete and ready for advertising at this stage, except for incorporation of final comments, if any. The final design documents shall consist of complete construction working drawings, edited guide specifications with bid schedule, design analysis, color boards and a cost estimate. These documents shall have incorporated all accepted comments resulting from the previous design submissions. The documents submitted shall have been given an Independent Technical Review by the A-E for completeness, compliance with Corps of Engineers design criteria, use of appropriate

analyses methods and assumptions and constructability prior to submission. The submission medium(s) and number of copies submitted for the Final Design shall be as required by the A-E Design Contract or specific instructions from the supervising district.

2.9.1 Drawings. Drawings shall be prepared using Computer-Aided Design and Drafting software following the drafting standards in Chapter VIII, Drawings. Drawings required for the Final Design submission shall include as a minimum:

2.9.1.1 General:

2.9.1.1.1 Cover sheet and index of drawings.

2.9.1.1.2 Location and vicinity map including haul routes.

2.9.1.2 Civil:

2.9.1.2.1 Site demolition plan (if required).

2.9.1.2.2 Site plan/details.

2.9.1.2.3 Grading plan.

2.9.1.2.4 Utility plan/profiles/details.

2.9.1.2.5 Pavement plan and details.

2.9.1.2.6 Soils boring locations and logs.

2.9.1.3 Architectural:

2.9.1.3.1 Demolition plan(s) (if required)

2.9.1.3.2 Floor plan(s).

2.9.1.3.3 Building elevations.

2.9.1.3.4 Interior and exterior wall sections.
2.9.1.3.5 Reflected ceiling plan.

2.9.1.3.6 Room finish and color schedules

2.9.1.3.7 Door and window schedules.

2.9.1.3.8 Perspective drawing.

2.9.1.3.9 Furniture plan.

2.9.1.3.10 Life Safety plan.

2.9.1.4 Structural:

2.9.1.4.1 Foundation plan(s) and details. Column grid lines, beam locations size and reinforcement, concrete slab thickness and reinforcement, construction, contraction and expansion joints. Precast plank or T sizes and details of connections and concrete overlay if needed. Clearly show any requirements for capillary water and vapor barrier or carton forms for voids below foundation slabs and beams.

2.9.1.4.2 Footing or drilled pier, grade beam, or rib mat integral rib and footing schedule(s) for size and reinforcement.

2.9.1.4.3 Roof framing plan(s) and details. Beam, joist, truss locations and sizes, roof deck type and details.

2.9.1.4.4 Intermediate floor framing plan(s) and details. Beam, joist girder and/or joist locations and sizes, slab type, thickness and reinforcement. Precast plank sizes and details of their connections and concrete overlay if needed.

2.9.1.4.5 Sections and details for superstructure framing structural members including structural steel connections, base plates and anchor bolts. Column, beam, and connection schedules.

2.9.1.4.6 Wall sections and details. CMU wall thickness, reinforcement size and spacing, control joint details, stiffener and lintel schedules. Exterior wall steel stud size, spacing, properties, and connections between members and to main structural members. Precast wall thickness, minimum reinforcement and connections to building main framing and/or between precast members.

2.9.1.4.7 All plans, sections, and details of special structural foundation and framing elements unique to the project.

2.9.1.5 Mechanical:

2.9.1.5.1 Equipment schedules/locations.

2.9.1.5.2 Plumbing plan, risers, and details.

2.9.1.5.3 Mechanical room plan with equipment clearances.

2.9.1.5.4 Fire protection plan.

2.9.1.5.5 HVAC plan and details.

2.9.1.5.6 Sequence of control and control schematics.

2.9.1.6 Electrical:

2.9.1.6.1 Site plan.

2.9.1.6.2 Lighting plan and fixture schedules.

2.9.1.6.3 Power plan and equipment layout.

2.9.1.6.4 Outline riser diagrams for power, communications, fire alarm, etc.

2.9.1.6.5 Communication plan.

2.9.1.6.6 Special plans as required. Examples: intrusion detection, cathodic protection, lightning protection, TEMPEST, television, etc.

2.9.2 Design Analysis. The design analysis address the items specified for a Final Design in Chapter IX, "Design Analysis" of the AEIM. All design calculations should be checked by a different individual than the one who performed the analysis. The following calculations are furnished at this stage:

2.9.2.1 Civil:

2.9.2.1.1 Pavement type and thickness of structure.

2.9.2.1.2 Sizing of utilities.

2.9.2.1.3 Sizing of storm drainage systems.

2.9.2.2 Structural:

2.9.2.2.1 Superstructure design load and analysis for main frame system. Design of beams, columns, lateral bracing, shear walls, horizontal diaphragms, and structural steel connections. Vertical dead and live loads and lateral loads caused by seismic and wind loads shall be included in the

superstructure design. Security engineering blast design provisions shall be provided for when applicable.

2.9.2.2.2 Foundation design loads and design analysis including sizing to satisfy allowable foundation bearing pressures and sizing and reinforcement of all structural foundation members.

2.9.2.2.3 Roof deck, floor slabs, exterior wall system, and all secondary framing completely designed. Security engineering blast design provisions shall be provided for when applicable.

2.9.2.3 Mechanical:

2.9.2.3.1 HVAC load calculations.

2.9.2.3.2 Fire protection calculations to include AFFF if appropriate.

2.9.2.3.3 Compressed air calculations.

2.9.2.3.4 Plumbing calculations.

2.9.2.4 Electrical:

2.9.2.4.1 Load calculations.

2.9.2.4.2 Lighting calculations.

2.9.2.4.3 Miscellaneous calculations as required. Examples; cathodic protection, lightning protection, TEMPEST, intrusion detection, etc.

2.9.3 Specifications. Requirements for the Final Design specifications are covered in AEIM Chapter VII, Specifications.

2.9.4 Cost Estimate. Requirements for the Final Design cost estimate are covered in AEIM Chapter X, Cost Engineering Guide for Military Construction.

2.10 **Corrected Final Design**. The design documents shall have been corrected based on the comments resulting from the Final Design submission and Bidability, Constructability, Operability (BCO) review by the supervising district. The A-E will perform a compliance check to assure all accepted

comments have been incorporated prior to submission of the Corrected Final Design. The Corrected Final Design submission shall consist of Contract Drawings, Project Specifications including Divisions 2 through 16 for technical requirements preceded by a Bid Schedule and Government provided Division 0 "Bidding Requirements and Contract Forms; Division" 1 "General Requirements"; final design analysis; submittal register ENG Form 4288 "Submittal Register"; DD Form 1354 "Transfer and Acceptance of Military Real Property" and a final MCACES Gold cost estimate. The construction drawings and specifications shall be suitable for reproduction as bidding documents for construction contracting. Amendments shall be made to the Contract Drawings and Specifications after advertising and before bid opening as needed to clarify construction requirements. A Bid Opening cost estimate incorporating all amendments shall be provided as specified in Chapter X. The submission medium(s) and number of copies submitted for the Corrected Final Design, Amendments, and final Contract Plans and Specifications with amendments shall be as required by the A-E Design Contract or specific supervising district instructions.

3. **MEDICAL PROJECTS GENERAL SUBMISSION REQUIREMENTS - ARMY/AIR FORCE**. Submittal requirements for medical projects are more complex and detailed than other military projects. Although the submittal requirements are generally the same for both Army and Air Force projects, the Army submittal requirements will be provided by the supervising district, while Air Force submittal requirements are stated in Military Handbook MIL-HDBK 1191.

4. **GENERAL DESIGN DOCUMENT REQUIREMENTS**.

4.1 **Drawings**. All drawings shall be prepared to conform with applicable provisions of the AEIM, Chapter VIII "Drafting." All final construction drawings shall be master CADD files and Vellum drawings plotted from CAL files, with number of copies as required in project Scope of Work. All drawings submitted shall be marked "Project Engineering," "Advanced-Final" or as applicable. Unless otherwise directed by the supervising district, all full-scale drawings shall be prepared on standard A1 metric size (594 mm X 841 mm). The scales used shall properly present the design data development; including detailed features when reduced to a half size sheet approximately 297 mm X 420 mm

size. Drawings for inclusion in brochures shall be on A4 metric (210 mm X 297 mm) or A3 metric (297 X 420).

4.2 **Specifications**.

4.2.1 The specifications shall be prepared in accordance with the AEIM, Chapter VII "Specifications" and include a bidding schedule with appropriate quantities and an index of the technical sections of the specifications. Use of SPECINTACT is mandatory.

4.2.2 The Final and Corrected Final Design specifications shall include the Government furnished construction contract General Conditions and Special Clauses, which will be provided to the AE.

4.2.3 To facilitate preparation of the Special Clauses by others, the following information shall be furnished by the AE with the design stage prior to the Final Design. Depending on the AE Scope of Work this may be the Charette, Project Definition/Project Engineering, Preliminary Design, or within 30 days after completion of the Pre-Design Conference if none to those submittals are required by the AE design contract.

4.2.3.1 Complete phasing (or sequence of work) requirements and any requirements to be included on utility outages (See AEIM, Chapter IX, Appendix C, "Project Phasing Data.")

4.2.3.2 A list of Government-furnished equipment which is to be installed by the construction Contractor. The list must include complete description and quantity of each item, place and time where equipment is or will be available to the construction Contractor, and whether or not the material is to be requisitioned by the District Office.

4.3 **Design Analysis**. A design analysis is required for all projects. The Design Analysis submitted shall include information, narratives, data, and computations necessary to support and describe the design developed, with sufficient detail to permit a complete understanding of the project design. It shall be prepared in accordance with the AEIM, Chapter IX "Design Analysis". The Design Analysis shall be produced on compatible computer files as specified in A-E Scope of Work. The calculations, typed and hand written shall be clear and legible and scanned into a computer file for submission with the Corrected Final Design Analysis.

All pages will be sequentially numbered. The A-E Contract will give the medium submission requirements.

4.4 **Cost Estimate**. The AE design team shall maintain the confidential nature of all project estimates prepared under the design contract with the Corps of Engineers. For all Army projects, an Engineering Form 3086 shall be prepared for all submittals through the 35% design. For all Air Force projects, an AF Form 1178 shall be prepared for all submittals except the Bid Opening. All estimates shall be prepared in accordance with the AEIM, Chapter X, Cost Engineering Guide for Military Construction.

4.5 **Color Boards**. Color boards depicting all architectural finishes shall be prepared in accordance with the AEIM, Chapter III "Architectural" and Chapter IX "Design Analysis." The intent is to provide a coded presentation document reflecting design and/or selection and color coordination of Construction Contractor furnished, structural related items. The Architect-Engineer may exercise the option of providing color boards organizing colors by color scheme, by space or room, or by combining these to adequately communicate his design intent. The color samples shall be coded and coordinated with the finish/color/graphics schedules of the contract documents. Actual color samples shall be displayed. Samples shall be large enough to indicate true patterns, color, and texture. However, care should be taken to present color and texture in direct proportion to that which will actually be installed in a given space. Project title should occur within the lower right-hand corner.

4.6 **Structural Interior Design (SID)**. Structural interior design services are a standard design requirement and will be accomplished as a part of the basic facility design in accordance with the AEIM, Chapter III "Architectural" and Chapter IX "Design Analysis." In addition to those requirements, a statement of design objectives shall delineate the designer's philosophy and intent relative to an interior design scheme before it is integrated into the construction documents and translated into physical form. A statement of interior design objectives is required to form a basis for developing design schemes that reflect the functional and behavioral needs of the ultimate user. The furniture footprint plan, while not considered a final layout, will demonstrate the designer's ability to comprehend and plan for the various functions that are to be

housed in the facility and, at the same time, provide the user a good indication of the adequacy of each space from a size and shape standpoint. The designer should use standard furniture sizes at this point since the final solution may utilize various combinations of new and used furniture.

4.7 **Comprehensive Interior Design (CID)**. Comprehensive Interior Design (CID) requirements include design, selection, and development of interior building materials, finishes and furnishings to ensure integrating the total architectural and interior concept to the functional requirements of the User. CID requirements, therefore, include Structural Interior Design (SID). The CID shall be prepared in accordance with the AEIM, Chapter III "Architectural" and/or criteria stated in AE SOW. In addition to those requirements, a statement of design objectives is necessary to delineate the designer's philosophy and intent relative to an interior design scheme before it is integrated into the construction documents and translated into physical form. A statement of interior design objectives is required to form a basis for developing design schemes that reflect the functional and behavioral needs of the ultimate user. Where applicable, include desired physiological and functional impact of the interior environment on its inhabitants and proposed method of accomplishing same by using space planning, shapes, forms, color, patterns, textures, fabrics and furnishings.

4.8 **ENG Form 4288 "Submittal Register."** This document identifies the shop drawings, continuation of design analysis, equipment specifications, and samples that the Construction Contractor will have to submit to the Government to assure that those items comply with the contract specifications. Items shall be classified for Government Approval (GA) or For Information Only (FIO). Use SpecsIntact software to prepare the Submittal Register.

4.9 **DD Form 1354 "Transfer and Acceptance of Military Real Property."** This document is a detailed listing of all real property by category description for the designed facility. It shall be accomplished at the completion of design and furnished with the Corrected Final Design. The category breakdown used in preparation of the DD 1354 shall be compatible with that in use at the particular base where the facility is located. The AE shall coordinate with the district Technical Leader and base personnel to establish the category breakdown requirements.

4.10 **Construction Schedule**. An estimate shall be prepared of the construction time in calendar days to complete the project. The estimate will be based upon a standard 40-hour workweek utilizing normal size crews of workers. The evaluation of construction time will consider restrictions such as working hours, security, access, noise level, joint occupancy requirements, etc. The potential impact on the schedule of adverse weather will not be considered by the A-E, but will be incorporated into the schedule by the Government. The A-E will incorporate phasing or sequencing requirements based upon User needs and/or design considerations. The estimated construction time developed shall be supported by a logic diagram showing the interdependencies of the major features of the project and the duration of each activity. The diagram shall be prepared in accordance with EP 415-1-5, Network Analysis Systems Guide, Chapter 3, Arrow Diagramming System. The diagram can be summary in nature, with the number of activities included to be determined by the size and complexity of the project. A narrative description should also be provided which describes the estimating process and considerations used in developing the construction time. The construction schedule data shall be furnished with Preliminary, Final Design, and Corrected Final Design phases and referenced in the Design Analysis as a supplement to Appendix C, Construction Phasing Data.

4.11 **Architectural Sketches/Renderings**.

4.11.1 Black and White Perspective(s). The drawing(s) is/are normally prepared and submitted with the Preliminary design. The intent is to prepare a single-line pencil, ink or computer generated perspective(s) from an eye-level or birds-eye view that best illustrates the most attractive features of the building.

4.11.2 Color Renderings. The requirements for the rendering are stated in the A-E SOW. The rendering is a color reproduction of the approved black and white perspective drawing prepared at the Preliminary design phase or as otherwise directed in writing.

4.12 **Architect-Engineer Design Quality Control Plan (QCP).** The A-E is required to submit a product QCP with the fee proposal. The minimum requirements for the QCP are given in ER 1110-1-12 and project SOW. The QCP is the A-E's management plans for execution of the contract. The QCP

describes the way in which the A-E will produce the deliverables, the steps that will be taken to control quality, and an assigned point-of-contact within the A-E's organization responsible for assuring compliance with the QCP. The Contracting Officer's Representative will notify the A-E, in writing, of the acceptance of the QCP. The QCP, modified to include any changes to the contract that occur, will be attached as an appendix to the design analysis.

4.13 **Miscellaneous**.

4.13.1 Site Adapt Designs. Previous designs supplied for site-adaptation for a project must be reviewed and updated to reflect site conditions and current regulatory requirements, standards and criteria.

4.13.2 Standard Designs. Changes to Standard Designs shall be avoided. Any changes require approval by CESWD and HQUSACE.

4.13.3 Energy Conservation. Design at all stages shall incorporate, where applicable, the criteria set forth in the AEIM, Chapter V for Energy Conservation.

4.13.4 Designing for the Handicapped. Structures likely to be used by the physically handicapped will be identified and shall be designed to facilitate access by the physically handicapped in accordance with the provisions of the Uniform Federal Accessibility Standards. The checklist of Items Governing Design for the Physically Handicapped, Chapter IX, Appendix D of the AEIM, shall be completed and submitted with the Final Design Analysis.